IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Sidlgata Sreenivasan et al.	Art Unit	: 1722
Serial No.	: 10/781,278	Examiner	: E. Luk
Filed	: February 18, 2004	Conf. No.	: 2060
Title	: IMPRINT LITHOGRAPHY TEMPLATE HAVING A MOLD TO COMPENSATE FOR MATERIAL CHANGES OF AN UNDERLYING LIQUID		

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P.O. Box 1450
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SUPPLEMENTAL APPEAL BRIEF

In view of the Notification of Non-Compliance sent on April 23, 2009, this Supplemental Appeal Brief is resubmitted:

I. REAL PARTY-IN-INTEREST

The real party in interest is The Board of Regents, The University of Texas System, which is the assignee of the entire right and interest in the present Application.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Appellants, the Appellants' legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-20 are pending in the Application.

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Claims 1-20 stand rejected.

IV. STATUS OF AMENDMENTS

There were no amendments to the claims or Specification filed after the Final Rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 recites a template to form a recorded pattern on a substrate from a conformable material disposed between the template and the substrate. The recorded pattern includes recorded features with designed dimensions. The template has an original pattern having original features with original dimensions. The original dimensions differ from the designed dimensions to compensate for volumetric changes of the conformable material that occurs upon the conformable material transitioning between first and second states. This is supported by FIG. 9 and paragraph [0083] of the specification.

Independent claim 9 recites a template to pattern recorded features on a substrate from a conformable material disposed between the template and the substrate. The recorded features have designed dimensions. The template has original features having original dimensions. The original dimensions differ from the designed dimensions to compensate for volumetric changes of the conformable material that occurs upon the conformable material transitioning between first and second states. This is supported by FIG. 9 and paragraph [0083] of the specification.

Independent claim 17 recites a template to form a recorded pattern on a substrate from a conformable material disposed between the template and

the substrate. The recorded pattern has recorded features with designed dimensions. The template has an original pattern having original dimensions. The recorded pattern has first dimensions in a first phase state and second dimensions in a second phase state that differ from the first dimensions. The first dimensions are established to compensate for volumetric changes of the conformable material between the first and second phase states to form the second dimensions. The second dimensions are substantially the same as the designed dimensions. This is supported by FIG. 9 and paragraph [0083] of the specification.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-20 stand rejected under 35 U.S.C. §102(b) as being clearly anticipated by *Chou* (US Patent No. 5,772,905).

VII. ARGUMENTS

Claims 1-20 are not properly rejected by the Examiner under 35 U.S.C. 102(b) as being anticipated by *Chou*.

The Examiner asserted that "*Chou* teaches the claimed template with the second state (14,16) and the first state (20), the template having a pattern with protrusions and recessions, the template being made from silicon dioxide (col. 4, lines 47-49)".

A. *Chou*

In response, Applicant asserts that at col. 4, lines 8-12, *Chou* teaches:

> "FIG. 1A shows a mold 10 having body 12 and molding layer 14. Molding layer 14 is shown as including a plurality of features 16 having a desired shape. A substrate 18 carries thin film layer 20."

Further, *Chou* teaches that mold 10 is pressed into thin film layer 20 (see, for example col. 4, lines 14-16). Still further, *Chou* teaches that after removal of mold 10, thin film layer 20 includes a plurality of recesses formed at compresses regions 24 which generally conform to the shape of features 16 (see, for example col. 4, lines 27-29). Yet further, *Chou* teaches:

> "Thin film layer 20 comprises a thermoplastic polymer (col. 4, line 50). During the compressive molding step shown in FIG. 1B, thin film 20 is heated at a temperature to allow sufficient softening of the film relative to the mold. For example, above the glass transition temperature the polymer has a low viscosity and can flow, thereby conforming to the features 16."

Chou discloses that in one experiment, thin film layer 20 was PMMA (col. 4, lines 57-col. 5, line 14). After heating mold 10 and PMMA 20 above the glass transition temperature, mold 10 and feature 16 were compressed against thin film 20 and held until the temperature dropped below the glass transition temperature.

B. *Chou* does not teach a material transitioning between thin film layer 20 and molding layer 14.

Applicants assert that *Chou* does not teach a material transitioning between thin film layer 20 and one or both of molding layer 14 and its features 16, as the Examiner appears to assert with the association of the "second state" with reference numeral 14 and the association of the "first state" with reference numeral 20. In contrast, *Chou* teaches that molding layer 14 is part of a first element, namely mold 10, and thin film layer 20 is carried on a second element, namely substrate 18. Thus, layers 14 and 20 are not part of the same element. Therefore it is unclear what would undergo a transition between molding layer 14 and thin film layer 20. Furthermore, *Chou* teaches that molding layer 14 and thin film layer 20 are made out of different

materials. For example, *Chou* teaches that layer 14 and features 16 may be made of silicon dioxide (col. 4, line 48), while thin film layer 20 comprises a thermoplastic polymer, for example PMMA (col. 4, lines 50 and 56). Further, *Chou* teaches that layer 14 molds (which inherently means that it remains firm) while both mold 10 and layer 20 are heated to a temperature high enough that the material of thin film layer 20 flows and conform to features 16 (col. 4, lines 65-67). Moreover, layer 14 and thin film layer 20 appear to be required to be made of different materials in order for the teachings of *Chou* at col. 4, lines 65-67 to be accomplished.

In contrast, Applicants' originally filed independent claims 1 and 9 each recite "upon said conformable material transitioning between first and second states." Further, Applicants' originally filed claim 17 recites "changes of said conformable material between said first and second phase states."

Applicants assert that to be conformable a material need not be conformable in both first and second states. For example, when the first state is liquid and the second state is solid, as recited in dependent claim 2, the conformable material is conformable in the first, liquid, state. Applicants further note that "state" is a term well-known in the chemical arts to refer to thermodynamic state, such as temperature, pressure, volume, and the like and/or phase state, such liquid, solid, and the like. This meaning is exemplified by Applicants' claims 2, 10, and 18 and paragraph [0083] of Applicants' specification. It is a property of a given material. Thus, the first and second states [first and second [phase states] recited in claims 1 and 9 [claim 17] are clearly states of the same conformable material.

For the foregoing reasons, Applicants respectfully assert that independent claims 1, 9 and 17 are neither anticipated by nor rendered obvious by *Chou* and therefore are patentable over *Chou*.

Further, Applicants respectfully assert that claims 2-8, depending from claim 1; claims 10-16, depending from claim 9; and claims 18-20, depending

from claim 17, are likewise neither anticipated nor rendered obvious by *Chou* and therefore are patentable over *Chou*.

C. *Chou* does not teach a template having features and/or a pattern having dimensions compensating for a volumetric change of a conformable material.

Furthermore, Applicants respectfully assert that *Chou* does not teach a template having features and/or a pattern having dimensions compensating for a volumetric change of a conformable material. In contrast, *Chou* teaches the opposite, namely that thin layer 20 conforms well to features 16, without disclosed compensation. For example; *Chou* discloses at col. 5, lines 7-10: "It was found that the preferred pressure is about 1900 psi. At that pressure, the pattern of the features 16 can be fully transferred into the PMMA." Likewise, at col. 5, lines 33-37 *Chou* discloses: "Furthermore, scanning electron miscroscopy of the PMMA patterns and the mold showed that the lateral feature size and the smoothness to the sidewalls of PMMA patterns fabricated using the present invention conform with the mold."

In contrast, Applicants' originally filed independent claims 1 and 9 recite "with said original dimensions differing from said designed dimensions sufficient to compensate for volumetric changes of said conformable material." Further, Applicants originally filed independent claim 17 recites "with said first dimensions being established to compensate for volumetric changes of said conformable material". Thus, Applicants respectfully assert that independent claims 1, 9 and 17 are neither anticipated by nor rendered obvious by *Chou* and therefore are patentable over *Chou*.

Further, Applicants respectfully assert that claims 2-8, depending from claim 1; claims 10-16, depending from claim 9; and claims 18-20, depending

from claim 17, are likewise neither anticipated nor rendered obvious by *Chou* and therefore are patentable over *Chou*.

All fees are being paid concurrently herewith on the Electronic Filing System (EFS). However, should any fees be required, the Commissioner is authorized to charge such fees to Deposit Account No. 502650.

Respectfully submitted,

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CLAIMS APPENDIX

1. A template to form a recorded pattern on a substrate from a conformable material disposed between said template and said substrate, with said recorded pattern having recorded features with designed dimensions; said template comprising:

an original pattern having original features with original dimensions, with said original dimensions differing from said designed dimensions sufficient to compensate for volumetric changes of said conformable material that occurs upon said conformable material transitioning between first and second states.

2. The template as recited in claim 1 wherein said first state comprises a liquid state and said second state comprises a solid state.

3. The template as recited in claim 1 wherein said original pattern comprises a plurality of protrusions and recessions, with a set of said plurality of protrusions and recessions having angled profiles.

4. The template as recited in claim 1 wherein said original pattern is formed on a surface of said template, with said original pattern comprising a plurality of protrusions and recessions, with a set of said plurality of protrusions and recessions having a width that varies in a direction normal to said surface.

5. The template as recited in claim 1 wherein said volumetric changes further a volumetric expansion of said conformable material.

6. The template as recited in claim 1 wherein said volumetric changes includes a volumetric contraction of said conformable material.

7. The template as recited in claim 1 wherein said original pattern comprises a profile selected from the group consisting of recessed and protruded, smooth, and planarized profiles.

8. The template as recited in claim 1 wherein said template comprises silicon, silicon dioxide, silicon germanium carbon, gallium nitride, silicon germanium, sapphire, gallium arsinide, epitaxial silicon, polysilicon, gate oxide, quartz, or a combination thereof.

9. A template to pattern recorded features on a substrate from a conformable material disposed between said template and said substrate, with said recorded features having designed dimensions; said template comprising:

original features having original dimensions, with said original dimensions differing from said designed dimensions sufficient to compensate for volumetric changes of said conformable material that occurs upon said conformable material transitioning between first and second states.

10. The template as recited in claim 9 wherein said first state comprises a liquid state and said second state comprises a solid state.

11. The template as recited in claim 10 wherein said original features comprises a plurality of protrusions and recessions, with a set of said plurality of protrusions and recessions having angled profiles.

12. The template as recited in claim 11 wherein said original features is formed on a surface of said template, with said original features comprising a plurality of protrusions and recessions, with a set of said plurality of protrusions and recessions having a width that varies in a direction normal to said surface.

13. The template as recited in claim 12 wherein said volumetric changes includes a volumetric expansion of said conformable material.

14. The template as recited in claim 13 wherein said volumetric changes includes a volumetric contraction of said conformable material.

15. The template as recited in claim 14 wherein said original features comprises a profile selected from the group consisting of recessed and protruded, smooth, and planarized profiles.

16. The template as recited in claim 15 wherein said template comprises silicon, silicon dioxide, silicon germanium carbon, gallium nitride, silicon germanium, sapphire, gallium arsinide, epitaxial silicon, polysilicon, gate oxide, quartz, or a combination thereof.

17. A template to form a recorded pattern on a substrate from a conformable material disposed between said template and said substrate, with said recorded pattern having recorded features with designed dimensions; said template comprising:
an original pattern having original dimensions, said recorded pattern having first dimensions in a first phase state and second dimensions in a second phase state differing from said first dimensions, with said first dimensions

being established to compensate for volumetric changes of said conformable material between said first and second phase states to form said second dimensions, with said second dimensions being substantially the same as said designed dimensions.

18. The template as recited in claim 17 wherein said first state comprises a liquid state and said second state comprises a solid state.

19. The template as recited in claim 17 wherein said original pattern comprises a plurality of protrusions and recessions, with a set of said plurality of protrusions and recessions having angled profiles.

20. The template as recited in claim 17 wherein said original pattern is formed on a surface of said template, with said original pattern comprising a plurality of protrusions and recessions, with a set of said plurality of protrusions and recessions having a width that varies in a direction normal to said surface.

EVIDENCE APPENDIX

No evidence was submitted pursuant to §§1.130, 1.131, or 1.132 of 37 C.F.R. or of any other evidence entered by the Examiner and relied upon by Appellants in the Appeal.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings to the current proceeding.